CLAIMS

What is claimed is:

1 1. A method for providing ringing timeout disconnect supervision in

2 remote telephone extensions, the method comprising the steps of:

3 providing a time limit for a first ringing voltage signal in response to

4 an attempted call, wherein the call is attempted via a voice over packet-data-

5 network system (VOPS);

6 ceasing generation of the first ringing voltage signal upon expiration of

7 the time limit; and

8 transmitting a control message to terminate the attempted call,

9 wherein the control message is transmitted via the VOPS.

1 2. The method of claim 1, further comprising the steps of:

2 placing a telephone call to a first switch system by dialing a number;

3 routing the telephone call to a second switch system;

4 generating a second ringing voltage signal to the second switch system;

5 detecting the second ringing voltage signal;

6 placing the second switch system in an offhook state in response to the

7 detected second ringing voltage signal;

8 creating a temporary logical connection using a wide area packet data

9 network; and

10 ringing a receiving telephone interface of a third switch system.

1 3. The method of claim 2, wherein the temporary logical connection is

2 created when a first VOPS switched call control system (SCCS) of the second

3　switch system establishes a connection with a second VOPS SCCS and the
4　receiving telephone interface of the third switch system using the wide area
5　packet data network and at least one network interface and at least one
6　telephone interface.

1　4.　The method of claim 2, wherein the first switch system comprises
2　private branch exchanges and public switched telephone networks (PSTNs).

1　5.　The method of claim 2, wherein the second switch system comprises a
2　private branch exchange interface, a PSTN interface, a VOPS SCCS, and a
3　packet data network interface, wherein the third switch system comprises at
4　least one telephone interface, a VOPS SCCS, and a packet data network
5　interface.

1　6.　The method of claim 5, wherein a timer of the VOPS SCCS of the third
2　switch system controls the time limit.

1　7.　The method of claim 3, wherein the step of ceasing generation of the
2　first ringing voltage signal comprises ceasing generation of the ringing
3　voltage at the receiving telephone interface, wherein upon expiration of the
4　time limit the second VOPS SCCS instructs the receiving telephone interface
5　to cease generation of the ringing voltage, wherein the second VOPS SCCS
6　transmits a control message to the first VOPS SCCS using the wide area packet
7　data network, wherein the control message indicates the attempted call is to
8　be terminated.

1　8.　The method of claim 2, further comprising the steps of:

2   placing the second switch system in an onhook state in response to the

3   received control message; and

4   releasing a first telephone interface, wherein the first telephone

5   interface is available for additional telephone calls.

1   9.   The method of claim 2, wherein the receiving telephone interface is

2   selected by a caller using DTMF digits entered in response to a secondary dial

3   tone generated by the second switch system.

1   10.   The method of claim 2, wherein the second switch system is

2   preconfigured to automatically select the receiving telephone interface in

3   response to a received call from a first telephone interface.

1   11.   The method of claim 6, wherein the timer comprises configurable

2   timers and fixed timers.

1   12.   The method of claim 1, further comprising the step of routing

2   integrated traffic comprising data, voice, video, Local Area Network-based,

3   and facsimile traffic, the step of routing comprising the steps of:

4   receiving at least one data stream, at least one voice channel, and at

5   least one video stream;

6   packetizing the received at least one data stream;

7   multiplexing the packetized at least one data stream, the at least one

8   voice channel, and the at least one video stream into a transport stream; and

9   providing the transport stream to at least one wide area packet data

10   network using a configurable trunk.

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1 ~~13.   The method of claim 12, wherein the at least one wide-area packet data~~

2 network comprises Asynchronous Transfer Mode (ATM), Frame Relay, High-

3 level Data Link Control (HDLC), Internet Protocol (IP), and Time Division

4 Multiplex (TDM) networks, and leased-line carrier services.

1 14.   The method of claim 12, wherein the at least one data stream, the at

2 least one voice channel, and the at least one video stream are integrated into

3 the transport stream and transported over at least one network comprising

4 cell-based and packet-based multi-service networks.

1 15.   The method of claim 14, wherein the at least one voice channel is split

2 out to an alternate network comprising a Public Switched Telephone

3 Network (PSTN) and a Time Division Multiplexed (TDM) network.

1 16.   The method of claim 12, wherein the at least one voice channel is

2 received from at least one private branch exchange, at least one key system,

3 and at least one telephone, wherein the transport stream comprises a

4 plurality of channels of compressed voice.

1 17.   The method of claim 12, further comprising the step of configuring the

2 configurable trunk at a physical level and a protocol level using at least one

3 trunk option, wherein configuring comprises using software to configure the

4 trunk among a plurality of service connections comprising T1 and E1, and

5 using software to allocate a plurality of trunk channels and time slots among

6 ~~at least one multi-service network connection.~~

1 18. The method of claim 17, wherein a first trunk option provides

2 structured trunking comprising time slot mapping, wherein at least one time

3 slot is used for on-net traffic and services, wherein at least one time slot is

4 used for drop/insert pass-through of unprocessed Public Switched Telephone

5 Network (PSTN) traffic.

1 19. The method of claim 17, wherein a second trunk option comprises an

2 ATM trunk option, wherein all channels and time slots of the configurable

3 trunk are used for T1/E1 ATM.

1 20. The method of claim 12, wherein the step of receiving comprises

2 receiving the at least one data stream, the at least one voice channel, and the

3 at least one video stream from at least one port comprising at least one

4 Ethernet port, at least one serial port, at least one digital voice port, and at

5 least one analog voice port.

1 21. The method of claim 12, wherein the at least one voice channel

2 comprises combinations of compressed and Pulse Coded Modulation (PCM)

3 voice.

1 22. An apparatus for providing ringing timeout disconnect supervision in

2 remote telephone extensions, the apparatus comprising at least one processor,

3 wherein the at least one processor is configured to control the apparatus to:

4   provide a time limit for a ringing voltage in response to an attempted

5 call wherein the call is attempted via a voice over packet-data-network

6 system (VOPS);

7   cease generation of the ringing voltage upon expiration of the time

8   limit; and

9   transmit a control message to terminate the attempted call, wherein

10   the control message is transmitted via the VOPS.

1   23.   The apparatus of claim 22, wherein the at least one processor is further

2   configured to control the apparatus to:

3   place a telephone call from a first telephone interface, wherein a

4   number is dialed causing a call to be routed to a first private branch exchange;

5   generate a ringing voltage signal on a telephone line coupled to a

6   second private branch exchange;

7   detect the ringing voltage signal and answering the call, wherein the

8   second private branch exchange enters an offhook state;

9   create a temporary logical connection using a wide area packet data

10   network, wherein a first VOPS switched call control system (SCCS) coupled to

11   the second private branch exchange establishes a connection with a second

12   VOPS SCCS and a second telephone interface using the wide area packet data

13   network and at least one network interface; and

14   signal receipt of the call at the second telephone interface, wherein a

15   ringing voltage is generated at the second telephone interface.

1   24.   The apparatus of claim 23, wherein a timer of the second VOPS SCCS

2   controls the time limit.

1   25.   The apparatus of claim 23, wherein upon expiration of the time limit

2   the second VOPS SCCS instructs the second interface to cease generation of

3   the ringing voltage, wherein the second VOPS SCCS transmits a control

4   message to the first VOPS SCCS coupled to the second private branch

5   exchange using the wide area packet data network, wherein the control

6   message indicates the attempted call is to be terminated.

1   26.   The apparatus of claim 23, wherein the at least one processor is further

2   configured to control the apparatus to

3   place the second private branch exchange in an onhook state in

4   response to the received control message; and

5   release the first telephone interface, wherein the first telephone

6   interface is available for additional telephone calls.

1   27.   The method of claim 23, wherein the second telephone interface is

2   selected by a caller using DTMF digits entered in response to a secondary dial

3   tone generated by the second private branch exchange.

1   28.   The method of claim 23, wherein the second private branch exchange

2   is preconfigured to automatically select the second telephone interface in

3   response to a received call from the first telephone interface.

1   29.   The method of claim 24, wherein the timer comprises configurable

2   timers and fixed timers.

1   30.   The apparatus of claim 22, wherein the processor is further configured

2   to control the apparatus to route integrated traffic comprising data, voice,

3   video, Local Area Network-based, and facsimile traffic, wherein the routing

4   comprises:

5   receiving at least one data stream, at least one voice channel, and at

6   least one video stream;

7   packetizing the received at least one data stream;

8   multiplexing the packetized at least one data stream, the at least one

9   voice channel, and the at least one video stream into a transport stream; and

10   providing the transport stream to at least one wide area packet data

11   network using a configurable trunk.

1   31.   The apparatus of claim 30, wherein the at least one wide area packet

2   data network comprises Asynchronous Transfer Mode (ATM), Frame Relay,

3   High-level Data Link Control (HDLC), Internet Protocol (IP), and Time

4   Division Multiplex (TDM) networks, and leased-line carrier services.

1   32.   The apparatus of claim 30, wherein the at least one data stream, the at

2   least one voice channel, and the at least one video stream are integrated into

·3   the transport stream and transported over at least one network comprising

4   cell-based and packet-based multi-service networks.

1   33.   The apparatus of claim 30, further comprising the step of configuring

2   the configurable trunk at a physical level and a protocol level using at least

3   one trunk option, wherein configuring comprises using software to configure

4   the trunk among a plurality of service connections comprising T1 and E1, and

5   using software to allocate a plurality of trunk channels and time slots among

6   at least one multi-service network connection.

1   34.   The apparatus of claim 33, wherein a first trunk option provides

2   structured trunking comprising time slot mapping, wherein at least one time

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3 slot is used for on-net traffic and services, wherein at least one time slot is

4 used for drop/insert pass-through of unprocessed Public Switched Telephone

5 Network (PSTN) traffic, wherein a second trunk option comprises an ATM

6 trunk option, wherein all channels and time slots of the configurable trunk

7 are used for T1/E1 ATM.

1 35. A computer readable medium containing executable instructions

2 which, when executed in a processing system, causes the system to perform

3 the steps of a method for providing ringing timeout disconnect supervision

4 in remote telephone extensions, the method comprising the steps of:

5 providing a time limit for a first ringing voltage signal in response to

6 an attempted call, wherein the call is attempted via a voice over packet-data-

7 network system (VOPS);

8 ceasing generation of the first ringing voltage signal upon expiration of

9 the time limit; and

10 transmitting a control message to terminate the attempted call,

11 wherein the control message is transmitted via the VOPS.

1 36. The computer readable medium of claim 35, wherein the method

2 further comprises the steps of:

3 placing a telephone call to a first switch system by dialing a number;

4 routing the telephone call to a second switch system;

5 generating a second ringing voltage signal to the second switch system;

6 detecting the second ringing voltage signal;

7 placing the second switch system in an offhook state in response to the

8 detected second ringing voltage signal;

9   ~~creating a temporary logical connection using a wide area packet data~~

10   network; and

11   ringing a receiving telephone interface of a third switch system.

1   37.   The computer readable medium of claim 36, wherein the temporary

2   logical connection is created when a first VOPS switched call control system

3   (SCCS) of the second switch system establishes a connection with a second

4   VOPS SCCS and the receiving telephone interface of the third switch system

5   using the wide area packet data network and at least one network interface

6   and at least one telephone interface.

1   38.   The computer readable medium of claim 36, wherein the first switch

2   system comprises private branch exchanges and public switched telephone

3   networks (PSTNs), wherein the second switch system comprises a private

4   branch exchange interface, a PSTN interface, a VOPS SCCS, and a packet data

5   network interface, wherein the third switch system comprises at least one

6   telephone interface, a VOPS SCCS, and a packet data network interface.

1   39.   The computer readable medium of claim 38, wherein a timer of the

2   VOPS SCCS of the third switch system controls the time limit, wherein the

3   timer comprises configurable timers and fixed timers.

1   40.   The computer readable medium of claim 37, wherein the step of

2   ceasing generation of the first ringing voltage signal comprises ceasing

3   generation of the ringing voltage at the receiving telephone interface,

4   wherein upon expiration of the time limit the second VOPS SCCS instructs

5   ~~the receiving telephone interface to cease generation of the ringing voltage,~~

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6   ~~wherein the second VOPS SCCS transmits a control message to the first VOPS~~

7   SCCS using the wide area packet data network, wherein the control message

8   indicates the attempted call is to be terminated.

1   41.   .The computer readable medium of claim 36, wherein the receiving

2   telephone interface is selected by a caller using DTMF digits entered in

3   response to a secondary dial tone generated by the second switch system.

1   42.   The computer readable medium of claim 36, wherein the second

2   switch system is preconfigured to automatically select the receiving telephone

3   interface in response to a received call from a first telephone interface.

1   43.   The computer readable medium of claim 30, wherein the method

2   further comprises the step of routing integrated traffic comprising data, voice,

3   video, Local Area Network-based, and facsimile traffic, the step of routing

4   comprising the steps of:

5   receiving at least one data stream, at least one voice channel, and at

6   least one video stream;

7   packetizing the received at least one data stream;

8   multiplexing the packetized at least one data stream, the at least one

9   voice channel, and the at least one video stream into a transport stream; and

10   providing the transport stream to at least one wide area packet data

11 network using a configurable trunk.

1   44.   The computer readable medium of claim 43, wherein the at least one

2   wide area packet data network comprises Asynchronous Transfer Mode

3   (ATM), Frame Relay, High-level Data Link Control (HDLC), Internet Protocol

4   (IP), and Time Division Multiplex (TDM) networks, and leased-line carrier

5   services.

1   45.   The computer readable medium of claim 43, wherein the at least one

2   data stream, the at least one voice channel, and the at least one video stream

3   are integrated into the transport stream and transported over at least one

4   network comprising cell-based and packet-based multi-service networks.

1   46.   The computer readable medium of claim 45, wherein the at least one

2   voice channel is split out to an alternate network comprising a Public

3   Switched Telephone Network (PSTN) and a Time Division Multiplexed

4   (TDM) network.

1   47.   The computer readable medium of claim 43, wherein the at least one

2   voice channel is received from at least one private branch exchange, at least

3   one key system, and at least one telephone, wherein the transport stream

4   comprises a plurality of channels of compressed voice.

1   48.   The computer readable medium of claim 43, wherein the method

2   further comprises the step of configuring the configurable trunk at a physical

3   level and a protocol level using at least one trunk option, wherein

4   configuring comprises using software to configure the trunk among a

5   plurality of service connections comprising T1 and E1, and using software to

6   allocate a plurality of trunk channels and time slots among at least one multi-

7   service network connection.

1 49. The computer readable medium of claim 48, wherein a first trunk

2 option provides structured trunking comprising time slot mapping, wherein

3 at least one time slot is used for on-net traffic and services, wherein at least

4 one time slot is used for drop/insert pass-through of unprocessed Public

5 Switched Telephone Network (PSTN) traffic, wherein a second trunk option

6 comprises an ATM trunk option, wherein all channels and time slots of the

7 configurable trunk are used for T1/E1 ATM.

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